

GORDON TECH HIGH SCHOOL CURRICULUM GUIDE

Course Title: Geometry
Department of: Mathematics

COURSE DESCRIPTION: The student will discover and apply geometric concepts such as distance, angle measure, and area as related to three dimensions.

COURSE GOALS / OBJECTIVES: The student will:

- represent problem situations with geometric models and apply properties of figures
- classify figures according to congruence and similarity and apply these relationships
- deduce properties of, and relationships between, figures from given assumptions
- use patterns, relationships, and problem-solving strategies to investigate and understand geometric content
- use instructional technology to provide meaningful visual representations of geometric concepts
- communicate geometric notions verbally and in writing
- apply logical reasoning and problem-solving techniques to explore real-life applications
- read and interpret written presentations of geometric ideas with understanding

Unit Outcomes for GEOMETRY

Unit 1: Introduction to Geometry

Upon completion of Unit 1 the student will:

- identify and draw a model of points, lines, and planes
- identify collinear and coplanar points and intersecting lines and planes
- find the distance between two points on a number line

- find the midpoint of a segment
- identify congruent segments
- identify an angle and its parts
- use the angle addition property to find the measure of angles
- classify angles as acute, obtuse, right, and straight
- identify and use congruent angles and the bisector of an angle
- identify and use adjacent angles, vertical angles, complementary angles, and supplementary
- identify and use right angles and perpendicular lines
- state the distinction between a postulate and a theorem

Unit 2: Parallel Lines

Upon completion of Unit 2 the student will:

- identify the relationships among pairs of angles formed by pairs of lines and transversals
- use the properties of parallel lines to determine angle measures
- identify and use angle conditions that produce parallel lines

Unit 3: Congruent Triangles

Upon completion of Unit 3 the student will:

- identify the parts of a triangle
- classify a triangle according to its sides and angles
- apply the angle sum theorem
- apply the exterior angle theorem
- identify congruent triangles
- name and label corresponding parts of congruent triangles

- use the SAS, SSS, and ASA postulates and the AAS theorem to test for triangle congruence

Unit 4: Applying Congruent Triangles

Upon completion of Unit 4 the student will:

- use congruent triangles to prove that segments and angles are congruent
- identify and use medians, altitudes, angle bisectors, and perpendicular bisectors in a triangle
- use the HL, HA, LL, and LA tests for congruence of right triangles
- apply the triangle inequality theorem

Unit 5: Quadrilaterals

Upon completion of Unit 5 the student will:

- define and identify a parallelogram
- use the properties of a parallelogram to find measures of segments and angles
- apply the conditions that ensure that a figure is a parallelogram
- identify and use the properties of rectangles, squares, and rhombi
- identify and use the properties of a trapezoid

Unit 6: Similar Triangles

Upon completion of Unit 6 the student will:

- solve a proportion
- identify similar triangles
- use proportional parts of similar triangles to solve problems

Unit 7: Right Triangles

Upon completion of Unit 7 the student will:

- find the geometric mean between a pair of numbers

- solve a problem using relationships between parts of a right triangle and the altitude to its hypotenuse

- use the Pythagorean Theorem

- use the properties of $45 - 45 - 90$ and $30 - 60 - 90$ triangles

Unit 8: Circles

Upon completion of Unit 8 the student will:

- name the parts of a circle

- determine relationships between segments, lines, and circles

- identify a major arc, a minor arc, and a semicircle

- find the measure of an arc and a central angle

- use relationships between arcs, chords, and diameters

- find the measure of an inscribed angle

- use properties of inscribed figures

- find the measure of angles formed by intersecting secants and tangents in relation to intercepted arcs

- find the circumference of a circle given the radius or diameter

- find the area of a circle

Unit 9: Polygons and Area

Upon completion of Unit 9 the student will:

- identify and name polygons

- find the sum of the measures of the interior and exterior angles of a convex polygon

- find the measure of each interior and exterior angle of a regular polygon

- find the area of a parallelogram, a triangle, a rhombus, and a trapezoid

Unit 10: Surface Area and Volume

Upon completion of Unit 10 the student will:

- identify the bases, lateral surfaces, and edges of a prism and a pyramid
- determine the lateral area, surface area, and volume of a prism and a pyramid
- determine the surface area and volume of a cylinder, a cone, and a sphere
- compare the surface area and volume of similar solids

Strategies for Achieving Outcomes:

Small groups of students will work as a team to share ideas, solve problems, and justify conclusions.

Students will use manipulatives to help them to grasp abstract concepts on a concrete level.

Assessments:

Homework assignments

Test and quizzes

Portfolios, which may contain results of works such as these:

open-ended questions, problems, and tasks: The student discusses in writing a mathematical situation, formulates hypotheses, makes generalizations, and so on;

research projects: The student uses resources outside the classroom in order to complete a long-term project;

journal entries: The student keeps written entries detailing such things as the methods used in solving a particularly difficult or interesting problem, or reflections and reactions about specific assignments or class activities;

cooperative learning activities: The student writes a summary of the work accomplished;

demonstrations: Students working individually, in pairs, or in groups demonstrate ideas using manipulatives, graph paper, compasses, calculators, or computers;

investigations: The student keeps a log which includes the date, a description of the work done, and questions the student has for the teacher. The teacher's response to the questions is recorded in the log;

models and simulations: The student writes a summary which describes the activity and includes relevant diagrams, sketches, and photographs;

non-routine problems: The student restates the problem in his own words, explores the problem by drawing a picture or a chart, chooses a strategy such as guess and test, look for a pattern, logical deduction, working backward, or exhaustive listing, and carries out the chosen strategy to solve the problem;

interviews: The student talks while the teacher listens and asks questions regarding the learner's thought processes as related to specific problems;

time-staggered samples: The student collects work samples dealing with the same mathematical idea completed at different times during the year;

Error notebooks: students keep a list of specific homework, test, and quiz problems that resulted in errors. A three-column format might include a statement of the problem as posed, a statement of the exact error made, and a correction and comment.

Specific Examples of Assessment Items:

Use strips of heavy paper and paper fasteners to demonstrate answers to the following: [1] Can a triangle include a right angle and an obtuse angle? [2] Can a triangle include two obtuse angles? [3] If a triangle includes a right angle, what must be true of the other angles?

Use a straightedge to draw a scalene triangle. Measure each side and draw a similar triangle with a scale factor of $\frac{1}{2}$. Write an explanation to prove that the two triangles are similar.

State as many conclusions as you can if each of the following situations occur: [1] Two chords of a circle are congruent. [2] A radius of a circle is perpendicular to a chord. Draw a diagram to illustrate each conclusion you state.